

## **TO SLIDEWARE OR NOT TO SLIDEWARE: STUDENTS' EXPERIENCES WITH *POWERPOINT* VS. LECTURE**

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### **ABSTRACT**

This study analyzes the performance and attitudes of technical writing students in *PowerPoint*-enhanced and in non-*PowerPoint* lectures. Four classes of upper-level undergraduates ( $n = 84$ ) at a mid-sized, Southern university taking a one-semester technical writing course were surveyed at the beginning and end of the course about their perceptions of *PowerPoint*. Of the four sections, two classes were instructed using traditional lecture materials (teacher at podium, chalkboard, handouts); the other two sections were instructed with *PowerPoint* presentations. All four classes were given the same pre- and post-test to measure performance over the course of the semester. Traditional lecture or *PowerPoint* presentations consisted of at least 50% of the course, with the remaining time spent on exercises and small group work. Results reveal that while most students say they preferred *PowerPoint*, performance scores were higher in the sections with the traditional lecture format.

### **INTRODUCTION: WHY A *POWERPOINT* STUDY?\***

In *The Cognitive Style of PowerPoint*, Edward Tufte argues that *PowerPoint* is "making us stupid, degrading the quality and credibility of our communication, turning us into bores, wasting our colleagues' time" [1, p. 24] through

\*Portions of this introduction appeared in "Technology for Technology's Sake: The Proliferation of *PowerPoint*." *Proceedings of the International Professional Communication Conference*, 2004.

non-narrative slides and inferior graphics. Some agree wholeheartedly with Tufte; Clive Thompson's discussion of Tufte's work in a *New York Times* article is titled "*PowerPoint* Makes You Dumb" [2]; Peter Norvig mocks *PowerPoint*'s AutoContent wizard in the "Gettysburg *PowerPoint* Presentation" [3], a cynical slideware rendition of President Abraham Lincoln's famous address; Ian Parker accuses *PowerPoint* of negatively editing our ideas in "*Absolute PowerPoint: Can a software package edit our thoughts?*" [4]; and Julie Keller of the *Chicago Tribune* asks "Is *PowerPoint* the Devil?" [5].

The *PowerPoint* backlash stems largely from Tufte's accusation in *Visual and Statistical Thinking: Displays of Evidence for Making Decisions* [6] that Microsoft's slideware program was indirectly responsible for the Space Shuttle Challenger accident. The day before the fatal launch, engineers sent materials to NASA to persuade against launching the shuttle because cold temperatures may cause the O-rings to fail. Morton Thiokol, Inc.'s Roger Boisjoly and Joe Kilminster presented charts to NASA on *PowerPoint* slides. These slides appeared in all capital letters; contained multiple sets of bullet points and even sub-bullet lists; used statistics but no cause-and-effect reasoning; and failed to mention the relationship between cold temperatures and possible O-ring failure. According to Tufte, "a better *analysis* of evidence about the threat of cold to the O-rings, as well as an effective *presentation* of evidence in order to convince NASA officials not to launch" [6, p. 18] may have prevented the Challenger incident from occurring.

Tufte also debunks *PowerPoint*'s "preoccupation with format not content," a concept he describes as "*PowerPoint* Phluff" [1, p. 4]. Tufte and others like Norvig specifically target *PowerPoint*'s AutoContent wizard for writing the presentation for the user, an ironic point considering the AutoContent's specious beginnings:

AutoContent was added in the mid-nineties, when Microsoft learned that some would-be presenters were uncomfortable with a blank *PowerPoint* page—it was hard to get started. "We said, 'What we need is some automatic content!'" a former Microsoft developer recalls, laughing. "'Punch the button and you'll have a presentation.'" The idea, he thought, was "crazy." And the name was meant as a joke. But Microsoft took the idea and kept the name—a rare example of a product named in outright mockery of its target customers [7].

In addition to the AutoContent wizard, *PowerPoint* is accused of encouraging us to "think in bullets," a cognitive activity that may affect our quality of ideas, not just our presentation style. Although this may sound absurd, Tufte cites a *Harvard Business Review* article which claims that narrative, not lists, outlines, or bullets, is the best method for consuming and remembering information. Citing cognitive scientist William Calvin, Gordon Shaw et al. argue in "Strategic Stories: How 3M is Rewriting Business Planning" that "writing is thinking. Bullets allow us to skip the thinking step, genially tricking ourselves into supposing that we have planned when, in fact, we've only listed some good things to do" [8, p. 42].

Although critics like Jean-luc Doumont in “The Cognitive Style of *PowerPoint*: Slides Are Not All Evil” argue that Tufte’s accusations are inherently flawed [9], the current *PowerPoint* backlash should, at the very least, cause technical communicators to pause and reconsider when we should and should not use *PowerPoint* as well as how to make our presentations (with or without slideware assistance) more effective. At the very least, we should take note that *PowerPoint* is used in over 30 million presentations a day and that *PowerPoint* software is on 250 million computers worldwide. According to Microsoft, *PowerPoint* was initially developed to save the inferior speaker from embarrassing presentations and audiences from bad speeches. But Cliff Nass, a Stanford University Professor, says that *PowerPoint* not only “lifts the floor” but that it also “lowers the ceiling.” What Nass means is that *PowerPoint* is used as a crutch by otherwise average or even above average speakers, making their presentations even worse. Nass uses himself as an example of “lowering the ceiling”:

I hate to admit this, but I actually removed a book from my syllabus last year because I couldn’t figure out how to *PowerPoint* it. It’s a lovely book called *Interface Culture*, by Steven Johnson, but it’s very discursive; the charm of it is the throwaways. When I read this book, I thought, ‘My head’s filled with ideas, and now I’ve got to write out exactly what those ideas are, and they’re not neat.’ [4].

*PowerPoint*’s influence has apparently affected our learners as well as our teachers. In “*PowerPoint* Goes to School” June Kronholz contends that “writing is reduced to bullets—fragments of sentences on which students may or may not elaborate during their presentations” [10, p. B1].

### LITERATURE REVIEW: *POWERPOINT* STUDIES

Whether or not *PowerPoint* affects learning has not been determined. To date, studies on students’ performance with *PowerPoint* reveal varied results. Evan’s 1998 pilot study of 161 students taking a General Psychology course found that students performed better (roughly 4 percentage points) with *PowerPoint* presentations as opposed to lectures with overhead transparencies, and those students liked *PowerPoint* better than transparencies [11]. Similarly, Harknett and Cobane [12] found students’ attitudes to be more favorable toward *PowerPoint*, but unlike Evans, there was no significant difference in exam scores by the International Relations students. Lowry’s 1999 United Kingdom study of 390 students enrolled in three sections of an Environmental Science course found an 8% point increase in those students in the *PowerPoint* cohorts [13]. However, Lowry did not give the same test to all three sections, only the same format of the test. These students preferred *PowerPoint* over transparencies.

In “Effectiveness of *PowerPoint* Presentations in Lectures,” Bartsch and Cobern found that students enrolled in Social Psychology scored lower on quizzes

over material presented on *PowerPoint* vs. overhead transparencies [14]. Bartsch and Cobern's follow-up study revealed that students performed worse because the "*PowerPoint* presentations included non-text items such as pictures and sound effects" [14, p. 77] and that these items were not connected to the presentation's content. Bartsch and Cobern's study follows another *Computers and Education* study by Szabo and Hastings in 2000 that found no significant difference between students' (mock) test performance in an economics course after *PowerPoint* vs. non-*PowerPoint* presented material [15]. Rankin and Hoaas's "The Use of *PowerPoint* and Student Performance" in 2001, also a study of students taking an economics course, found no significant difference in performance [16].

More recently, Blokzijl and Naeff's 2004 study surveyed 69 Dutch students' reactions to *PowerPoint* as a tool and to lectures using *PowerPoint* instead of overhead transparencies [17]. These students preferred *PowerPoint* over transparencies and liked the slides with large font sizes, unity in layout, and easy-to-view color contrasts. Not surprisingly, these are the same features that teachers and authors emphasize when teaching effective *PowerPoint* presentations.

My goal is to further these studies by analyzing pre- and post-test performance data for technical writing students with and without *PowerPoint* instruction. Do students perform better or worse in courses that are based on lecture material presented using *PowerPoint*? I also measure these same students' attitudes regarding learning with (or without) *PowerPoint* presentations via pre- and post-course surveys.

## MATERIALS AND METHODS

Four classes of upper-level undergraduates at a mid-sized, Southern university taking a one-semester technical writing course were surveyed at the beginning and end of the course about their perceptions of *PowerPoint*. The majors of the students varied, with roughly one-fourth engineering majors, one-fourth computer science, one-fourth IT majors, and one-fourth "other," mainly humanities and education majors. All four sections ( $n = 84$  students) were also given the same pre- and post-test to measure performance with or without *PowerPoint* over the course of the semester. Lecture consisted of approximately 50% of the course, with the remaining time spent on communication exercises or small group work. Two classes of students were instructed using traditional lecture materials (teacher at podium, chalkboard, handouts); the other two sections were instructed using *PowerPoint*.

Unlike earlier studies, I did not compare overhead transparencies with *PowerPoint* presentations for two reasons. First, all performance studies so far have compared *PowerPoint* to transparencies, and the results have been mixed. The only possible exception is Szabo and Hastings' study, which assessed students' opinions of *PowerPoint* lectures in contrast to their memory of

traditional lecture in other courses that the students had taken in previous semesters. However, Szabo and Hastings define *traditional lecture* as “Lectures delivered without the significant use of IT equipment other than overhead projectors and possibly the occasional use of an audio-visual (VHS and audio playback) apparatus” [15, p. 177], a definition that still allows for use of overhead transparencies.

Second, although certainly different media, *PowerPoint* and transparencies are both slides. Unless the presenter is using video, *PowerPoint* at its base level is an electronic slideshow of transparencies. And because Tufte argues for paper handouts and other printed materials to replace *PowerPoint* [1, p. 24], I conducted my study to be a comparison of lecture with handouts and *PowerPoint*. No overhead or video equipment was used.

Each section met thirty (+/- one) times. Approximately half of the class meetings were devoted to lecture material with handouts or one of more *PowerPoint* presentations. The subject matter covered topics relevant to effective technical communication: document design and formatting, style and tone, mechanics, audience analysis, graphics, organization, etc. Both the lecture materials and the *PowerPoint* presentations were designed to help students create more effective technical documents and function well in industry. The *PowerPoint* slides and the handouts contained text and graphics but no video.

The pre- and post-tests were the same and were designed to measure performance via writing prompt to produce a memo. All 84 students handwrote the pre-test memo on the first day of class and the post-test memo on the last day of class. To ensure anonymity, the memos were typed into electronic MS Word files by a departmental work-study. The work-study removed the names from both tests so that it was impossible to tell which were pre-test memos and which were post-test ones. No feedback was provided to the students for either test.

Because the same material was covered in both courses, students had the same assignments, deadlines, and evaluations. Assignments were graded holistically and analytically, with a numerical and letter grade marked on each. Although the students did not see the feedback for the pre-test and post-test, I graded this assignment using the same evaluative methods. All the memos were graded over a two-day period, and because of the anonymous template and numbering, pre-test and post-test distinctions as well as if the student was from a *PowerPoint* or lecture section could not be determined.

As for measuring attitudes, all 84 students were given the same survey to determine overall perceptions of *PowerPoint* before and after a course with no *PowerPoint* or one that is largely *PowerPoint*-driven. These surveys qualitatively measured students' perceptions through open-ended questions like “I gain more knowledge from (a) *PowerPoint* or (b) lecture because . . .” Demographic information—gender, age, and major—was also requested to see if perceptions of *PowerPoint* varied.

## DISCUSSION: STUDENTS' ATTITUDES

Table 1 shows students' overall perceptions of *PowerPoint* vs. traditional lecture. The table also compares students' attitudes in the *PowerPoint* and non-*PowerPoint* sections at the beginning and end of the course. Not unexpectedly, students from all four sections preferred *PowerPoint*, although apparently not as much as students surveyed in other studies. According to Szabo and Hastings, more than 90% of the students surveyed saw *PowerPoint* as "more attention capturing than the traditional method of lecturing" [15, p. 179] and 75% of students believed *PowerPoint* helped them learn better [15, p. 181]. Seventy-nine percent of students in my study say they preferred *PowerPoint*, whereas 62% felt *PowerPoint* improves their classroom learning.

Because my survey was qualitative, students were given room to qualify their choices. This is why a handful of students chose "both," even though it was not presented as an option in the survey question. Students who preferred *PowerPoint* applauded its visual aides. One student remarked that he "stay focused more consistently on the visuals of PP." Many students labeled themselves as "visual learners." Students also liked *PowerPoint*'s apparent efficacy, such as the ease of printing slides, which allows the students to review the slides at home or "to sit in class and not have to take notes at all."

Traditional lecture supporters mentioned the preference for good teacher-class interaction and their frustrations with *PowerPoint*: "Powerpoints—they are like an outline and not detailed"; "I gain more from lecture because I will pay attention to what is being said versus falling asleep to a boring powerpoint presentation"; "Lecture, because it is more animate and interacted [sic]." Even though more students like *PowerPoint*, a substantial number (22 or 26%) believed they learned more from lectures.

Students who preferred a combination of lecture and *PowerPoint* noted how the two together cut across varied learning styles: "Both verbal and visual teaching techniques have their strengths" and "The more sense I use when learning, the more information I retain." Some remarked that the choice depended on the type of

Table 1. Students' Perceptions of PowerPoint and Traditional Lecture Methods

Survey question	<i>PowerPoint</i>	Lecture	Both	Total
I like (a) <i>PowerPoint</i> or (b) lecture better because . . .	66 (79%)	5 (6%)	13 (15%)	84 (100%)
I gain more knowledge from (a) <i>PowerPoint</i> or (b) lecture because . . .	52 (62%)	22 (26%)	10 (12%)	84 (100%)

teacher: “I’ve had some profs that did great PP presentations and others that were horrible”; “I gain more knowledge based on how well a teacher presents the information. If its [sic] PPT then fine, lecture fine but so long as the information is good then it doesn’t matter.” One student lauded his ability to learn from both: “Both are equal due to the fact that I am multitalented in my ability to understand explanations.”

Tables 2, 3, and 4 provide a summary breakdown of students by gender, age, and major, to see if the varied responses can be categorized by demographics. All students were upper-level graduates (juniors and seniors). Other than the slight variation of women liking and learning from *PowerPoint* over lecture, age and major are not significant determiners of preference. The age variable is potentially surprising, considering **that one might expect students** as they get older to become saturated with *PowerPoint*. For instance, Szabo and Hastings found that *PowerPoint* preference fell from 88% in first-year students to 75% in third-year students exposed predominantly to *PowerPoint* lectures, a decrease that may be contributed to saturation levels [15, p. 181]. “In this case, the attention capturing

Table 2. Breakdown of Students' Perceptions  
by Gender

Gender	Totals	Like PP over Lecture	Learn more from PP vs. Lecture	Like both	Learn from both
Men	55	42 (76%)	32 (58%)	8 (15%)	6 (11%)
Women	29	24 (82%)	20 (69%)	5 (17%)	4 (14%)

Table 3. Breakdown of Students' Perceptions  
by Age

Age	Totals	Like PP over Lecture	Learn more from PP vs. Lecture	Like both	Learn from both
17-20	9	4 (44%)	2 (22%)	3 (33%)	3 (33%)
21-25	49	41 (84%)	36 (73%)	6 (12%)	5 (10%)
26-30	9	7 (77%)	4 (44%)	2 (22%)	2 (22%)
31-35	8	7 (87%)	5 (63%)	1 (12%)	1 (12%)
Over 35	9	7 (77%)	5 (55%)	1 (11%)	1 (11%)
	84	66 (79%)	52 (62%)	13 (15%)	10 (12%)

Table 4. Breakdown of Students' Perceptions by Major

Major	Totals	Like PP over Lecture	Learn more from PP vs. Lecture	Like both	Learn from both
Engineering	18	14 (77%)	11 (61%)	3 (16%)	2 (11%)
Comp Sci	20	15 (75%)	13 (65%)	3 (15%)	2 (10%)
IT	29	24 (83%)	20 (69%)	4 (13%)	4 (14%)
Education	3	1 (33%)	0 (0%)	1 (33%)	1 (33%)
Humanities	14	12 (86%)	8 (57%)	2 (14%)	1 (7%)
	84	66 (79%)	52 (62%)	13 (15%)	10 (12%)

power of the method [*PowerPoint*] could be expected to fade away once the novelty effect disappears” [15, p. 179]. However, because the students in my study attended a commuter university where the average age of undergraduates is 25, older students coming to college for the first time may be less exposed to *PowerPoint* than a 19-year-old who has experienced it over and over again in college (and maybe even high school) lectures. Interestingly, students over age 30 in this study actually preferred *PowerPoint* more than students in the 17-20 age group (see Table 3).

### DISCUSSION: STUDENTS' PERFORMANCE

Table 5 shows the breakdown of test scores per class. Results reveal that while most students say they preferred *PowerPoint*, performance scores were higher in both sections with the traditional lecture format. This result is somewhat surprising considering that other studies found no significant difference in scores [12, 15] or that *PowerPoint* viewers scored better [1, 13]. However, Bartsch and Cobern, in the first part of their three-part study, did find that their *PowerPoint* group scored worse on quizzes, but they later countered this data through a follow-up study that showed the *PowerPoint* presentations themselves were of inferior quality [14]. Szabo and Hastings found no significant difference in test scores despite the students' overwhelming preference for *PowerPoint*: “Overall, the results of this study suggest that digital *PowerPoint* lecturing is perceived by the students as beneficial to learning, but the actual grades do not support this” [15, p. 181].

Unlike Bartsch and Cobern, I avoided non-text items which did not relate directly to the content of the *PowerPoint* lecture, nor did I use any sound effects. I carefully constructed the *PowerPoint* presentations to be as effective as possible (no text heavy slides, effective contrast, large font, appropriate color, parallel



Table 5. Performance Averages on Pre-Test and Post-Test by Section

Class	Pre-test score (avg)	Post-test score (avg)
PP (section #1)	74.1%	77.5% (+3.4 percentage points)
PP (section #2)	75.3%	80.2% (+4.9 percentage points)
Lecture (section #3)	71.0%	79.8% (+8.8 percentage points)
Lecture (section #4)	76.9%	83.6% (+6.7 percentage points)

headers, etc.); in fact, they were the same presentations I had used in previous sections of the same course prior to this case study. My goal in the *PowerPoint* sections was the same in the lecture sections—I wanted my students to learn good technical writing strategies so that they would be more effective communicators in the workplace.

There are several possible reasons why the students in the traditional lecture section scored higher on the post-test: (1) traditional lecture format is more conducive for my presentation style; (2) my *PowerPoint* presentations were not designed as effectively as I thought they were; (3) the slideware sections received too much *PowerPoint*, causing saturation; (4) students in the traditional lecture sections were better students; (5) students in the *PowerPoint* sections were entertained by the presentations but did not learn the skills they needed to be more effective technical communicators; and/or (6) students do not necessarily need (so much) *PowerPoint* in their classes, despite their preferences and the pressure on instructors to please students and to include technology in almost every aspect of the technical communication course. Although it is impossible to generalize about all students or even all *PowerPoint* audiences from this small case study, it is interesting to note that both lecture sections scored higher than both *PowerPoint* sections in the post-test.

## CONCLUSIONS

While I do not agree with Tufte that *PowerPoint* is making us and our students stupid [1, p. 24], this case study reveals unpredicted results. Because most of us are aware of the connection between enthusiasm for learning and higher performance, we might assume that using a format that our students prefer would yield better test scores: if students like the presentation style, they'll come to class more often, listen more carefully, and absorb the information to such a level that they will be able to apply the knowledge or skill learned effectively. This does not appear to be the case, and it is "hard to determine whether such a desire [for *PowerPoint*] emerges from personal needs for better education or for better entertainment" [15, pp. 181-182]. These results indicate that while *PowerPoint* may be popular

with most students, this popularity may be for the eye candy aspect of *PowerPoint* rather than because some students are “visual learners,” as they claimed in their attitudes survey. Yes, they prefer the visual prop, but it is not clear how much or what they learn from it. One student wrote: “*PowerPoint* is more visually stimulating, but that’s about it for *PowerPoint*.”

Although this is an academic case study, there are some implications for practitioners. *PowerPoint* is still used in over 30 million presentations a day, and *PowerPoint* software is on 250 million computers. For many practitioners, *PowerPoint* has grown to be norm in presentations; audiences expect *PowerPoint* or some sort of technology flash, just as students do. Shaw, Brown, and Bromiley argue in their defense of narrative over bullets that audiences may initially reject a presenter who turns over the slide projector [8, p. 46], but ultimately strategic narratives will interest and inform the client/audience much more effectively. They argue that the dramatic conflict and resolution of a good strategic narrative—combined with the enthusiasm of the presenter—will secure attentive and *learning* audiences/clients.

In a recent interview, Tufte defended his critique of *PowerPoint* as an ethical issue:

I thought that too many PP presentations were not about truth and evidence. They were about power and marketing. [*The Cognitive Style of PowerPoint*] suggests PP, because of its cognitive style, is a moral or an ethical issue because PP so strongly enforces a certain type of cognitive style, which is not truth oriented but rather market oriented [18, p. 457].

*PowerPoint* may indeed be the best presentation tool for sales and other marketing presentations. Whether or not it is the best medium for academic lectures or other types of knowledge and skill presentations has yet to be determined. In our efforts to “lift the floor” of inferior presenters as Stanford University Professor Cliff Nass argues, we must be cautious as not to “lower the ceiling” [4]. Several sources offer advice on how to create the most effective *PowerPoint* presentations for audiences. The problem is determining which audiences—and which presenters—would be more effective with little or no slideware “help.” Larger studies are needed to assess the link between *PowerPoint*, cognition, preferences, and performance.

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